

Landesberg (M)

BLENNORRHOEA

OF THE

NEW-BORN INFANT.

copy
ITS PREVENTION AND TREATMENT.



BY M. LANDESBURG, M.D.,
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BLENNORRHOEA OF THE NEW-BORN INFANTS.

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BY M. LANDESBURG, M.D.

THE frequent occurrence of blennorrhœa among the new-born infants is evidently shown by the great percentage of cases which are met with in the lying-in hospitals and foundling asylums, and by the considerable number of cases which are treated year by year in the different eye hospitals and dispensaries. A few data collected from the reports of the different institutes will give an approximate idea of the prevalence of this affection.

In the Obstetrical Clinic at Bonn, Kilian has observed blennorrhœa neonatorum in fifty per cent. of the 468 infants that had been born there in the years between 1828 and 1834. In the lying-in hospital at Strasburg the percentage was ten from 1872 to 1877. In the lying-in wards of the Berlin University there were 195 cases of blennorrhœa neonatorum among 11,654 births which had occurred in the years between 1829 and 1847, and 521 cases among 10,092 births in the years between 1858 and 1869. In the lying-in wards of the Royal Charité at Berlin the percentage of blennorrhœa neonatorum in the years between 1817 and 1839 was between twelve and twenty-one per cent., and between seven and nine per cent. in the years between 1839 and 1879. Once, in March, 1859, the percentage of blennorrhœa neonatorum amounted to fifty per cent. among 69 infants.

The lying-in hospital at Dresden figures with twenty-five per cent. of blennorrhœa neonatorum in 1875. In Halle the percentage was more than twelve per cent., but decreased to three per cent. after prophylactic treatment had been introduced.

In Munich, in the years between 1850 and 1861, the percentage was from 3.82 to 0.8 per cent. (No antiseptics were used.) Stuttgart figures with six to twenty per cent. in the years between 1828 and 1880. In Leipzig there were from ten to seven per cent. in the years between 1849 and 1879, and only 0.5 per cent. after prophylactic treatment had been instituted.

In the Maternité, at Paris, 332 severe cases of blennorrhœa of the new-born infants had been treated by Trélat in the years between 1864 and 1865.

The Obstetrical Clinic, at Leyden, shows in

the period between 1848 and 1849, among 68 new-born infants, 15 infants afflicted with blennorrhœa.

In the lying-in wards at Stockholm the percentage of blennorrhœa neonatorum in the years between 1849 and 1857 was from five to seven per cent. In Christiania it was from six to twelve per cent. in the period between 1848 and 1857.

In the Foundling Hospital at Prag, 454 cases of blennorrhœa occurred in the period between 1836 and 1839, and 314 cases in 1865. In the Foundling Asylum at Milano, with 264 inmates, 64 showed blennorrhœa neonatorum.

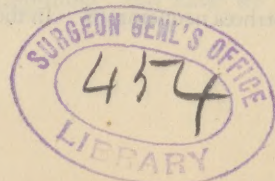
The Foundling Asylum of Vienna has received every year of the period between 1856 and 1867 from 10,000 to 11,000 infants. Of these, from 160 to 600 suffered from blennorrhœa, of whom from thirty to eighty per cent. had been brought in with the affection. Of the 140 cases which could be examined a few hours after the outbreak of blennorrhœa, the latter was found in either eye in 97 cases, in the right eye in 19, and in the left eye in 24. Of the 43 cases of monocular blennorrhœa, the other eye remained healthy in 14 cases.

The Foundling Asylum at St. Petersburg shows a yearly admittance of about 6,000 infants, of whom from 500 to 600 are affected with blennorrhœa. The infants are mostly suffering already from the disorder when first admitted.*

Arlt (Vienna) has observed in three years, between 1862 and 1865, among 8451 eye patients, 74 cases of blennorrhœa neonatorum. Dor (Bern), in ten years, between 1867 and 1876, among 8008 eye patients, 194 cases of blennorrhœa. Hirschberg (Berlin), in three years and a half, among 21,040 eye patients, 314 cases. Schöller (Berlin) 156, and Hörner (Zurich) 161 cases among 10,000 eye patients respectively. Arcoleo (Palermo) reports 81 cases among 2849; Stephan (Frankfurt a. M.) of 13 cases among 2845, and Knapp (New York) of 34 cases among 3873 eye patients.

But the mere fact of the frequent occurrence of blennorrhœa among the new-born infants, however alarming it may be, is not the only reason to claim for this affection the highest attention of the medical profession and of the

* For many of these data I am greatly indebted to the most valuable treatise of Dr. D. Hausmann, entitled "The Infection of the Conjunctiva in New-born Infants."



sanitary authorities. A still greater claim to the deepest interest of all who are concerned in the welfare of the future generations lies in the undeniable fact of *blennorrhœa neonatorum* being one of the chief causes of blindness. An inquiry into the etiology of blindness will fully corroborate this statement. Whether we resort for information to the reports of the different blind asylums, or we examine into the statistical papers on this subject which have been lately published by several oculists, we are struck by the painful fact to meet in all these instances, with surprising regularity, with one and the same cause to which is due the greatest percentage of blindness. *This cause is the blennorrhœa of the new-born infants.* It is worth while to look somewhat closer to this matter which has so important a bearing upon the human society.

The records of the blind asylums generally show that more than fifty per cent. of all the inmates of such institutes have lost their eyesight in the first weeks of their life in consequence of blennorrhœa. The statistics of twenty-two blind asylums in Germany for ten years (1865 to 1875) show that forty per cent. of the patients therein received had lost their sight from this cause during their earliest infancy. The percentage of blindness due to the same cause in some special blind asylums is as follows: 8 in Copenhagen, 20 in Berlin, 30 in Vienna, 26 in Oberdoebbling, and 60 in Lemberg. In the blind asylum at Dresden the percentage of blindness caused by blennorrhœa neonatorum has decreased in twenty years, from 1855 to 1875, from fifty to thirty-one per cent. In the blind asylum of Berlin the percentage has diminished, in the period between 1857 and 1879, from forty-one to twenty-nine per cent. In other blind asylums the percentage of blindness amounts to about seventy-five per cent. Dr. Coppez, of Brussels, reports that the blind asylums of Belgium are mostly peopled by children whose blindness had been caused by blennorrhœa neonatorum. Of the 96 inmates he had examined in two blind asylums of Brussels, 33 were blind from this disease. In the blind asylum of Amsterdam the percentage of total blindness, due to the same cause, amounted to thirty-five per cent. Dr. Moore, of New York, estimates that half of the population in the blind asylums of New York had the eyesight destroyed by blennorrhœa neonatorum. In the blind asylum

of Philadelphia, Harlan has found (1871), of 167 inmates, 55 blind from purulent ophthalmia, and more than fifty per cent. of the latter blind from blennorrhœa neonatorum. Dr. Emrys Jones, of Manchester, has found the same affliction to be the cause of total blindness in 24 of the 72 cases which he had examined for admission to Henshaw's Blind Asylum. In the blind asylum for young persons at Paris, with 208 inmates, 95 had their sight destroyed by blennorrhœa neonatorum. And now we have to bear in mind that only such children are admitted to a blind asylum who have lost their sight without any hope of recovery. Of those who have lost one eye only, and whose other eye has retained a certain amount of vision, or of those whose eyesight has only partly been destroyed by this terrible disease, we are absolutely unable to give any estimate at all.

In the Maternité at Paris, of the 3227 cases of blennorrhœa neonatorum which had been treated by Trélat in the years between 1864 and 1865, total blindness occurred in 12. In the Foundling Asylum at St. Petersburg there occurred, in 1847, 16 cases of total blindness; later on, only 6, 1, 2, 12, but 15 again in 1864. In the Foundling Asylum at Prag total blindness occurred in 29 cases out of 454 cases of blennorrhœa neonatorum which had been observed there in the years between 1836 and 1839, and in six cases only out of 314 cases of blennorrhœa neonatorum in 1865. In the subsequent twelve years no case of blindness occurred. In the Foundling Asylum at Vienna the instances of total blindness were 11 in 1854, and only one case in 1863 and 1864. A report from France, published in 1834, shows that twenty-seven per cent. of all cases of blindness which had occurred there in the last twenty years were due to blennorrhœa neonatorum. In the last twelve years blennorrhœa neonatorum has increased in France to such a degree that it causes about thirty-two per cent. of all cases of blindness. According to Dumont (1856), of 2050 blind people, 263 had lost their sight by variola and 75 by purulent ophthalmia in the earliest infancy. According to Brochin's estimate, there were in 1861 in France 30,780 blind people, of whom 4609 had lost their sight mostly by blennorrhœa neonatorum. F. Daumas (1879) has observed among 56,391 eye patients 1178 cases of incurable blindness, 817 cases of which were due to blennorrhœa neonatorum. Also in Spain

and England blennorrhœa neonatorum is the cause of the high figure of blindness which is met with there; but we have no reliable statistics upon this matter.

Dr. Hirschberg, selecting from a material of 7500 eye patients the 100 cases of amaurosis, has found blennorrhœa neonatorum to be the cause of blindness in sixteen per cent. The same cause of total blindness has been ascertained by Horner in 11 cases out of 161, by Knapp in 4 out of 34, by Arcoleo in 7 out of 81, by Albert in 11 out of 100, and by Bremer in 12 out of 116 cases of amaurosis. Dr. Katz has found that of all cases of blindness in the district of Düsseldorf, with a population of 1,338,065, only five per cent. were due to blennorrhœa neonatorum. His investigations were based upon the statistical returns which had been forwarded to him by the Prussian government. But, having resided in Elberfeld at the time of Katz's investigations, I know from personal experience that his figures have been taken too low, and that his statistical data are incorrect. Certainly those who know the difficulty of similar researches will easily pardon these defects. Later on, making similar researches in the districts of Potsdam and Frankfurt a. O., Katz has found of 245 cases of blindness 11.4 per cent. to be due to blennorrhœa neonatorum. In the reports of Dr. Stolte, on 436 cases of blindness, there are 31 cases which are due to blennorrhœa neonatorum. In the communication of Dr. Krückow, on 409 cases of blindness extracted from a material of 5000 eye patients, blennorrhœa neonatorum figures as the cause of blindness with seven per cent. At a meeting of the Manchester Medical Society, Dr. Emrys Jones gave the details of 420 cases of blennorrhœa neonatorum presented for treatment at the Royal Eye Hospital, a large proportion of which had been under previous treatment. In 38 cases both corneæ were affected, in 34 one cornea was affected, in 16 both eyes were lost, and in 21 one eye was lost. In 26 cases there were ulcers of the cornea; in 14 cases there was perforation, 6 with prolapse of the iris; in 16 there were large corneal opacities; in 5 there were ulcers with lead deposits; in 4 there were ulcers with the deposits of nitrate of silver.

The results of my own experience in this matter are as follows:—

Of 8767 eye patients who came under my observation during my ophthalmic practice at

Elberfeld, in Prussia, there were 580 cases of blindness. These cases, classified according to their etiology, showed that blennorrhœa neonatorum had caused blindness in 15 children, of whom 9 lost both eyes and 6 one eye.

In the German Eye and Ear Dispensary under my charge in this city, 163 cases of blennorrhœa neonatorum have come under my treatment during a period of about five years and a half (from Aug. 1, 1876, to Dec. 31, 1881). Of these 163 cases of blennorrhœa neonatorum, there was no complication in 31. Of the remaining 132 cases, there was blindness of both eyes in 7 and of one in 21 cases. In these instances of monocular blindness, the cornea of the other eye showed deep ulcerations in 8 (with prolapse of iris in two, and anterior synechiæ in three); superficial ulcerations in 5; maceration of the epithelial layer in 6; and normal condition only in 2. In 41 cases both corneæ had deep ulcers, with prolapse of iris of either eye in 7, and of one eye in 9 cases. In 23 cases only one eye showed deep ulcerations of the cornea; the other eye was normal in 3, had superficial ulcerations in 15, and maceration of the epithelial layer in 5 cases. In 16 cases there was superficial ulceration of either cornea; in 9 cases only one cornea was superficially affected. In 7 cases there was maceration of the epithelial layer of either cornea, and of one cornea in 8 eyes. Besides the total loss of 28 eyes in children, I have on record 5 cases of monocular blindness in adults, also due to blennorrhœa neonatorum.

In presence of these statistical tables, we may fairly ask, What is the meaning of these sad manifestations? What is the reason of this frequent occurrence of such a fatal disease and of its disastrous effects which we see taking place in the different parts of the world with an almost fatal regularity? Have we to regard this disease and the consequent loss of eyesight as an inevitable necessity, as the result of a scourge, from which there is no escape for mankind? Or is the human society responsible for the growth and development of an evil which, attacking the babe hardly out of its mother's womb, throws it back into eternal darkness? In other words, have we to regard blennorrhœa neonatorum as one of those terrible diseases which, in the great majority of cases, baffles all our therapeutic efforts; or is blennorrhœa neonatorum itself not a malignant disease from the beginning; and have we rather to

charge the external circumstances, as carelessness and thoughtlessness of the parents, neglect of the nurses, and improper treatment by the physicians, for the serious consequences, for the great figure of loss of eyesight which is involved in this terrible affection?

A deeper study into the pathology of blennorrhœa neonatorum will give us a satisfactory answer to all these questions.

Blennorrhœa neonatorum is characterized by the redness and swelling of the mucous membrane of the eyeball, and by the discharge of a thick, purulent, yellowish pus from the tarsal conjunctiva. The affection generally sets in within the first week after birth, but it may develop somewhat later, as, on the contrary, it has been observed in a few instances in full height at the first day after birth. In the dispensary and private practice it is very difficult, and mostly impossible, to obtain reliable information about the time when the first symptoms of inflammation had set in. A better opportunity to inquire into this subject is given to the physicians in charge of the lying in hospitals and foundling asylums. But the information on this subject is scanty, and the only trustworthy statistical data we have are due to the report of Dr. Teramin on 476 cases of blennorrhœa neonatorum, extracted from the records of the Foundling Hospital of St. Petersburg. His tables show that the first symptoms of the affection have manifested themselves from the first to the fourth day after birth in 57 cases; from the fourth to the eighth day after birth in 134 cases; from the eighth to the fourteenth day after birth in 94 cases; later in 191 cases.

Galezowski reports a case of blennorrhœa neonatorum in which the affection has been observed in full development immediately after delivery, and complete slough of both corneæ forty-eight hours later. A similar case of purulent ophthalmia immediately after birth has been observed by Haase. I, also, have met with a case of virulent blennorrhœa eighteen hours after delivery. Mother and nurse ascertained that the infant was born with swollen lids, which were glued together by a thick, yellowish matter, and that the discharge had been very copious from the beginning. At the time of my examination the morbid process was in full height, the tumefaction of the lids and the chemosis of the conjunctiva of the eyeball were very intense, and the secretion of pus enormous. Both corneæ were hazy, and showed

deep central ulceration. In spite of an energetic appropriate treatment both eyes were lost by total maceration of the corneæ.

Blennorrhœa neonatorum commonly begins with the symptoms of a simple catarrhal conjunctivitis. The eyelids are somewhat swollen and reddish, and the eyelashes are glued together in the morning by a sero-mucous matter. The tarsal conjunctiva is succulent and vascular, and presents a velvety appearance. There may be also some hyperæmia of the conjunctiva of the eyeball, and some thin sero-mucous secretion during the day. The eyes are sensitive to the light; the eyelids are kept closed, and only opened when the room had been darkened. In the meanwhile, when nothing had been done to check the morbid process, the symptoms change to the worse. The swelling of the lids progresses; the discharge becomes more copious, thicker, and yellowish. It glues together the eyelashes, and sometimes greatly distends the eyelids by the retention of the secretion between them. The eyelids are continually kept closed. If the latter are everted, the mucous membrane appears oedematous, highly congested, with hypertrophied papillæ. The conjunctiva of the eyeball is either only hyperæmic or somewhat chemotic. If the disease is neglected in this stage, as is but too frequently the case, the exacerbations of the morbid process goes on increasing. The lids swell up excessively. The tumefaction is especially marked in the upper lid, which, presenting the appearance of a red, hot, puffy tumor of the size of a pigeon's-egg, or still larger, hangs down and overlaps the lower lid. The upper lid can hardly be everted, and on every attempt to have it done the retrotarsal folds, in which the swelling has attained the highest degree, will be pushed forward, and thus prevent the inspection of the tarsal conjunctiva and of the cornea. The discharge is purulent, thick, creamy, flowing abundantly between the eyelids over the cheek, and sometimes corroding the skin. The space between the eyelids, the conjunctival sac, is totally filled up by the secretion, in which the cornea is entirely imbedded. The tarsal conjunctiva is enormously swollen, and either cherry-red or reddish-blue. The conjunctiva of the eyeball is mostly highly infiltrated, and surrounds the cornea like a wall. In this state of the morbid process we will mostly find either a diffuse haziness, or small, irregularly-shaped erosions of the epithelial layer of

the cornea. This is the beginning of morbid changes in the cornea, which, if not timely checked, will lead to a fatal issue. If the destructive process progresses, it may either involve the whole or only a part of the cornea. In the former instance the whole cornea is destroyed by maceration, lens and humor vitreous are evacuated, and the morbid process ends with total leucoma and atrophy of the eyeball, or with buphthalmus, or with atrophied stump. In these instances vision is irrevocably lost. If the loss of substance has been confined to a limited space only of the cornea, perforation of the latter ensues, involving prolapse of iris and sometimes anterior polar cataracts. The final result in these instances will be circumscribed leucoma and anterior synechiæ. Vision is not totally destroyed, and it may be improved by consequent operations.

The duration of the affection varies according to the severity and intensity of the inflammatory symptoms. Eight to ten weeks are about the average in which the morbid process runs and completes its course. The first symptoms of improvement are marked by the abatement of the inflammatory symptoms, and by the change in the quantity and quality of the discharge. The tumefaction of the lids and of the conjunctiva gradually diminishes, until at last the morbid process assumes the characteristics of a chronic conjunctival catarrh. The transparency of the cornea generally suffers by diffuse or limited opacities, or by central leucoma, even in those instances in which the affection has run its course most favorably. In many cases we also meet with central capsular cataract. The loss of vision entailed by these pathological changes in the cornea or the lens is in the greatest majority of cases not inconsiderable.

The affection may develop from the very first in both eyes simultaneously, or in one eye only. In the latter instance the other eye also gets very soon involved in the morbid process. The cases are rare in the ophthalmic practice in which preventive measures have succeeded to save the other eye from the fatal complication.

Blennorrhœa of the new-born infant is an infectious disease, caused by the action of a specific virus, and propagated by the conveyance of that virus from body to body. In other words, we have to regard blennorrhœa of the new-born infant as a contagious disease, dependent on the presence of a specific virus

in the secretion of the maternal passages or in decomposing animal matter, and which virus is transmited during parturition, or after birth to the mucous membrane of the new-born infants. The specific virus of blennorrhœa neonatorum has been demonstrated to be inherent to particular micro-organisms, to the micrococci of the great family of Schizomycetes, which are found in the pathological secretions of the vagina of the pregnant, respectively parturient women. The quantity of the infective organisms which are contained in the pathological vaginal discharge increases with the virulence of the latter. The more virulent therefore the nature of the discharge, the greater then is the danger of the new-born infant becoming infected with the germ of the disease. Leucorrhœa, or, still more, gonorrhœa, of the mother is apt to give the greatest percentage of blennorrhœa in new-born infants. Next in frequency of infection will be the lochial secretions of the mother, and lastly, the disease may also be produced under certain circumstances by a simple catarrhal secretion of the vagina.* The way in which the pathological vaginal discharge is conveyed to the tarsal mucous membrane of the infant may be explained, with Hausmann, in the following manner: In head presentations the vaginal discharge attaches itself to the eyelashes and eyelids, from which parts it may spread to the conjunctiva as soon as the eyes have been opened; in face mal-presentations, however, in tedious labors, and in the various forms of forceps' cases, the inoculation of the conjunctiva with the infectious vaginal fluid within the maternal vagina may also be accomplished by the fingers of the examining medical attendant.

The pathological vaginal discharge is, however, as was mentioned above, not the only and exclusive cause of blennorrhœa neonatorum. The latter has been observed to develop from the absorption of decomposing animal matter, which had been brought in direct contact with the eye of the infant. The intensity of the

* Not only the mucous membranes of the eye are liable to be affected by the vaginal discharge during the act of parturition, but also those of the mouth, nose, and anus. From my own observations I can fully corroborate Hirschberg's remarks, that in new-born infants catarrhal inflammation of the mucous membranes of the nose and the external auditory canal are often met with in conjunction with blennorrhœic affections of the conjunctiva.

morbid process and the gravity of its course, depends in these instances also mainly upon the quality and quantity of the infecting material which had been absorbed. Brière reports a case of blennorrhœa neonatorum which had been caused by the application of a piece of the still warm placenta to the eyelid, in order to cure a pigment mole of the latter. The habit among the lower classes of people to apply to the eyes of the infant raw meat and other animal matter the very moment they show any symptom of inflammation, may breed similar infections.* Equally favorable conditions for the propagation of the germ of the contagious disease are given by the sero-mucous discharge of an inflamed nipple or mammary gland, or by the purulent discharge of a mammary abscess, etc. In other instances decomposing blood-clots from the vagina of the puerpera, or some pus from any other source, may be carried, from criminal neglect and carelessness, by the fingers of the mother herself, or the nurse, to the eyes of the new-born infant, and cause there the development of the fatal disease. In lying-in hospitals and foundling asylums blennorrhœa neonatorum of one infant may be communicated by means of the indiscriminate use of sponges, washbasins, towels,

* I have on record five cases in which cow-dung, and one case in which cloths, saturated with the menstrual flow of a supposed virgin, were applied to the eyes of new-born infants, in order to combat the first symptoms of inflammation, which had appeared in the first days after birth. These were the worst cases of blennorrhœa neonatorum I ever had the misfortune to meet with in my practice. At the first examination I found both eyes totally destroyed in two children, and one eye totally destroyed in three children. Of the latter, the remaining eyes offered the following conditions: One eye had central perforation of the cornea, with prolapse of iris. The final result was: Ectatic leucoma of the cornea; anterior synechiæ; central capsular cataract. Only the upper segment of the cornea was transparent. Another eye showed deep corneal ulcerations, and healed with diffuse opacities. The third eye showed opaque pyramidal staphyloma, with occlusion of pupil. On the upper inner quadrant of the cornea there was a small segment of transparent tissue. Iridectomy restored perception of light. The only child in whom both eyes were preserved showed deep ulceration of the right cornea, and superficial infiltration of the left cornea. Treatment gave a fair result. The child on whose eyes the menstrual flow of the virgin had been applied was one of the two in whom both eyes were destroyed. The supposed virgin was found to suffer from virulent fluor albus.

etc., to the healthy eyes of the other children, and produce in this way great havoc among them. Lastly, we cannot lose sight of the possibility of the *infection in distance*, however rare the occurrence may be, which is mostly apt to take place in badly ventilated and overcrowded foundling asylums and lying-in hospitals. Sattler is of the opinion that the vaginal secretions of the puerpera, saturated with micrococci, may dry up, pulverize, and mix with the air of the room as dust, and come in this manner in contact with the conjunctiva of the new-born infant, in which it will find the proper hot-bed to cultivate and develop the virus and produce the purulent ophthalmia. Arlt inclines to the hypothesis that the fluid which evaporates from the surface of a blennorrhœic conjunctiva, and remains suspended as fine water-drops in the air, may carry along with it minute particles of the purulent secretion, and become in this way the medium through which the infection in distance is propagated.*

The exact period of incubation has not been ascertained with certainty. It is generally assumed to be from three to seven days. In all instances in which blennorrhœa neonatorum has been observed in full development on the first days after birth, we may assume that the infection had taken place in the maternal vagina during labor. Cases of mal-presentations of any kind, or those in which forceps have to be applied, are most liable to incur the inoculation at such an early period. The infection has taken place during the passage of the infant's head through the vagina, or shortly afterwards, in all those cases in which blennorrhœa appears during the first week after birth. The later appearance of the pernicious ophthalmia in infants gives unmistakable evidence of the criminal neglect and carelessness with which they have been dealt with, and of the utter want of cleanliness in which they have been kept.

To ascertain whether the purulent ophthalmia

* It is a sad fact that from twenty to fifty per cent. of all cases of ophthalmia which occur in the foundling hospitals are due to the propagation of the disease in the institute itself. The affection is carried from one to the other by the indiscriminate use of towels, sponges, clothes, etc., by allowing one bed to be occupied by several children, and by the lack of cleanliness and the prevailing ignorance of the nurses. The number of nurses infected in different foundling asylums is as follows: In St. Petersburg, with 2918 cases of blennorrhœa neonatorum, 345 nurses; in Vienna, with 3964 cases, 49 nurses; in Prag, with 543 cases, 4 nurses.

of new-born infants is caused by a discharge from the genitals of the mother, affecting the eyes of the child during birth, Dr. Cederschjold had the question put to every woman delivered during the year 1832 in the general lying-in hospital in Stockholm, whether or not she had such a discharge. 360 women were delivered, and subtracting those who had born dead children, or whose children died a few days after birth, there remained 328. Of these, 137 had a discharge from the genitals, and 181 had not. 30 infants had purulent ophthalmia, namely, 20 whose mothers had a discharge, and 10 whose mothers had none. Hence it appears that discharge from the genitals are extremely common among pregnant women, that women may be afflicted with such a disorder without giving their offspring purulent ophthalmia, and that children may have the disease though the mothers have no discharge, a proof that the malady may arise from other causes. But when we consider that of the children born of mothers affected with a discharge, 20 in 137, or about 1 in 7, suffered from the ophthalmia, while only 10 in 181, or about 1 in 18, of those whose mothers were unaffected had the ophthalmia, and that, therefore, the proportion of the former was nearly three times as great as that of the latter, we may assume that a discharge from the genitals of the mother, though not the sole cause of the disease, is a very frequent one.

The results of this inquiry, although accepted and indorsed by no less an authority than William Mackenzie, had no immediate practical bearing upon the current notions of the pathogenesis of blennorrhoea neonatorum. The teachings of the Danish physician, of such eloquent significance and vital importance, came to due honor only in the most recent times, when the investigations into the relation of micro-organisms to the causation and propagation of diseases have demonstrated beyond any doubt the intimate solidarity which exists between the pathological discharge of the vagina of the mother and the purulent ophthalmia of the new-born infant. The proposition now generally accepted is that the pathological discharge of the vagina of the puerpera has to be regarded as the hot-bed swarming with living organisms which cause and spread the disease.

Hausmann has found among 250 pregnant women of the lower classes, a mucous secretion in 83, and normal discharge only in one case. Among 50 pregnant women of his pri-

vate practice, there was mucous secretion of the vagina in 30, and in no instance purulent secretion. Heyfelder states that of 10 women in Berlin, of 15 in Paris, and of 20 in Amsterdam, one is affected with fluor albus.

Hausmann's researches into this subject, which have been fully corroborated by subsequent investigations, are most worthy of notice. The normal vaginal discharge of healthy pregnant women shows acid reaction, and always contains a few micrococci, some spores, minute mucous corpuscles, and numerous inert bacterium threads. Later on, with the increase of the vaginal discharge during the further course of pregnancy, the acidity increases also, the number of the mucous corpuscles and of the bacteria augments, and new forms of the lower organisms make their appearance. We find then in the vaginal discharge *Trichomonas vaginalis*, *Lepthotrix vaginalis*, and *Oidium albicans*. The development of these microzœa becomes enormous in the gonorrhœal, respectively leucorrhœal, conditions of the vaginal discharge.

The presence of micrococci in the lochial secretion of the puerperæ is, according to Karewski, of constant occurrence. Hausmann, examining under the microscope minute particles of the secretion which he had taken from the conjunctival sac of new-born infants a few minutes after delivery, has found that they contain the same elements as the vaginal discharge of the mother. Haub has examined, according to the method used by Koch, 11 cases of blennorrhœa neonatorum, 5 cases of gonorrhœa urethræ, and 2 cases of gonorrhœal ophthalmia. The micrococci are identical in all these secretions, and are exclusively confined to the nuclei or protoplasm of the pus-cells, and are not found in the intervening fluid. They are sometimes single, but more frequently double (dioplococci), two spherules lying together, separated by a small interval. The micrococci are somewhat larger than the usual bacteria. The number of micrococci corresponds with the severity and intensity of the morbid process. As long as there is secretion, there are micrococci. With the improvement in the condition of the vaginal secretion, the number of micrococci diminishes until the latter disappear almost totally.

Hirschberg and Krause have examined, after Koch's method, in a large number of cases the secretions of the vagina and the conjunctival

discharge of blennorrhœa neonatorum. Their results are as follows:—

The benign fluor albus swarms with micrococci and bacteria, and contains besides pus-corpuscles and epithelial cells.

The normal vaginal discharge of a healthy primipara shortly before the confinement contains a great number of bacilli, numerous epithelium cells, very few pus-corpuscles, and cocci of limited extent.

Normal lochial secretions (taken on the second day after delivery) contain cocci in small quantity and lying in single groups.

In the case of a pregnant women shortly before confinement, with suspicious virulence of the vaginal discharge, only a few cocci were found. In the case of a gravida, with copious fluor albus and slight granular colpitis, the discharge showed numerous cocci.

In virulent fluor albus; on the sixth day after confinement (both eyes of the new-born infant were slightly affected), only a few cocci were found. The same condition was ascertained in another case of virulent fluor albus three weeks after delivery. The eyes of the new-born infant had been infected on the second day in spite of the prophylactic treatment, as recommended by Credé.* The secretion of the conjunctiva contained a sparse number of cocci.

The secretion of blennorrhœa neonatorum was examined in 30 cases, in most instances several days in succession; in others, for two to four weeks; in one case 35 microscopical preparations were made. In all cases micrococci were found in the conjunctival secretion in conjunction with pus- and epithelial-cells; only in one instance, which almost bore the features of a simple conjunctival catarrh, there were found bacterium-threads and a sparse number of bacilli. The fact has also been ascertained by these observers, that the decrease of micrococci keeps equal pace with the improvement of the morbid process. The microorganisms disappear totally when the normal condition of the mucous membranes has been established.

Blennorrhœa of the new-born infant is from the beginning not a malignant disease. Watched in its first symptoms it affords in most instances a favorable prognosis and a certain cure. The principal cause that the morbid process involves

such serious consequences is, in these instances, as in many others, neglect, carelessness, ignorance of the absolute need for skilled medical treatment, and improper treatment. Slight affections of the conjunctiva, which subside either without any treatment or by a mild astringent, or in spite of the most improper therapeutics, occur so often in new-born infants, and the parents are so accustomed to them, that they are regarded as a harmless affair only. If the affection takes a more serious course, the midwife or the nurse is at hand with her advice, and the mother's anxiety is quieted hearing similar cases cited which have been cured in a short time by the proposed remedies. Even in wealthy families, the family physician is rarely called in at the beginning of the affection. There, too, the nurse, the old aunt, or the grandmother wield the sceptre, while in the lower classes their rule is tyrannical. It is one of the saddest experience of the oculist to hear, in presence of such cases which have been ruined by criminal carelessness, the old and always repeated answer, that the child has been most carefully treated with warm poultices, according to the advice of the nurse backed by a good lady friend.

The cases of blennorrhœa neonatorum which generally come under the notice of the oculist are mostly in an advanced state of the morbid process, with highly-developed symptoms of inflammation. In general we may state as a rule that the longer blennorrhœa neonatorum has been allowed to run its course unchecked, the more developed we find the symptoms of inflammation; and the deeper the morbid alterations in the corneal tissue, the more unfavorable is the prognosis. But even in the advanced stages of the malady, experience teaches us to distinguish three forms of the purulent ophthalmia. Of these forms, one is benign; it may heal almost without any treatment, or even under inappropriate treatment. The cornea is not involved in the morbid process. The other form is more dangerous, and may become malignant by neglect or improper therapeutics. The prognosis in this instance is unfavorable, because the affection has the tendency to draw into sympathy the cornea and to effect morbid changes in its tissue, which will always bring about impairment of vision. The greatest percentage of total loss of vision is due to this form of blennorrhœa.

* In all these cases the local treatment of the maternal passage was carried on from the beginning.

We have no external symptoms to distinguish between these two forms. Their real character is only shown by the subsequent course they take. Two babes in the first week of their life are brought to the physician. The symptoms of intense inflammation are alike in both; the discharge in both is thick, yellowish, creamy, flowing abundantly over the cheeks. The physician expects to find in either of the children the corneæ either totally destroyed or very badly injured. The eyelids of one child is drawn apart, the cornea is seen to be covered with a thick layer of pus, and when the latter had been removed, the physician finds to his astonishment that the cornea is totally intact. It remains in this condition during the whole treatment, and the recovery is complete. Now, to the other child. The corneæ may be totally destroyed, or they may be occupied by ulcerations, or there may be found perforation of the cornea with all its fatal consequences. However successful you may be with your treatment, the transparency of the cornea cannot be restored, and the vision will remain impaired to a large extent. A third form of purulent ophthalmia of the new-born infant gives the worst prognosis. It is the most malignant of all inflammatory diseases of the human eye, and the most fatal in its consequences even if proper treatment was adopted early. This distinct form, which is fortunately of somewhat rare occurrence, develops from gonorrhœal inoculation. The gonorrhœal ophthalmia of the new-born infant is always caused by the specific virus contained in the virulent gonorrhœal discharge of the mother, who had been infected previously by the man with whom she had had sexual intercourse. The chain of events is as follows: first, gonorrhœa of the man; secondly, gonorrhœa of the pregnant woman; and lastly, gonorrhœal ophthalmia of the new-born infant. The infection of the latter may take place either in the maternal vagina during protracted labor, or during the passage of the infant's head through the vagina, or after birth by direct transmission of the virulent gonorrhœal matter to the infant's eyes. Gonorrhœal ophthalmia of the new-born infant bears all the features of blennorrhœa neonatorum, only that the inflammatory symptoms are more strong, and their destructive course are more rapid. We may say that gonorrhœal ophthalmia is a blennorrhœa of the new-born infant in its worst character. All symptoms of inflammation are

more pronounced; the swelling of the lid and of the conjunctiva of the eyeball is the highest possible; the discharge is thick, creamy, yellow, and of enormous quantity. The cornea becomes very soon infiltrated in its whole extent, the epithelium sloughs, the maceration of the corneal tissue progresses very rapidly, and the morbid process may complete its fatal course in a few days unchecked and uninfluenced in any way by the therapeutics.

Of the seven cases of gonorrhœal ophthalmia of new-born infants which have come under my treatment, I saw two cases on the second respectively on the third day after birth. In either child the morbid process was in its full acme, and discharge enormous. In the one child both corneæ were still intact; in the other they showed maceration of the epithelial layer. In this latter instance great swelling of the lids and profuse yellowish discharge were noticed by the attending physician immediately after delivery. There had been protracted labor and application of forceps. In spite of the proper treatment and most rigorous and attentive attendance, the final issue of either case was phthisis of the eyeballs. I must say that the corneæ sloughed almost under my very eyes, and the remedies had no effect whatever. Two cases were brought to me on the seventh and one case on the eighth day of delivery. In the first two instances there was total maceration of the corneæ; in the latter instance there was central perforation of the right cornea, with prolapse of iris, lens, and humor vitreous, and perforation of the left cornea with prolapse of iris. One case I observed on the fourth week; there were only small stumps left. To one case I was called in consultation on the eighth day after birth. The affection had developed from the fifth day after delivery. The infection had taken place by direct transmission of the gonorrhœal discharge of the mother to the infant's eyes. The mother had been infected by her husband a few days before confinement, and showed the symptoms of virulent gonorrhœa on the second day after confinement. My examination of the infant's eyes revealed deep ulceration of either cornea, the sloughing of which could not be prevented by the subsequent treatment of the attending physician. I saw the case about six weeks afterwards; the tarsal conjunctiva was still much swollen, the discharge was thick and yellowish, and the eyeballs showed adherent total leucoma of either cornea.

In all other six cases the infection of the mother by her husband or lover a short time before delivery, could also be ascertained beyond any doubt.

As in all other conditions of human life, also in this instance, "an ounce of prevention is better than a pound of cure." We have learned of the intimate connection which exists between the discharges of the maternal vagina and the morbid conditions of the palpebral conjunctiva of the new-born infant. In order to avoid the effect, in order to save the eye of the new-born infant from inoculation, we have to eradicate the cause of the disease—we have to stop the very source from which is spread one of the most fatal disorders of the human eye. There is hardly any disease the prevention of which is so within human control as blennorrhœa neonatorum. But to effect this desideratum, the rational treatment of this affection must start before the birth of the infant. It must begin with the pregnant mother, in order to avoid by prophylactic measures and antiseptic appliances, as far as possible, any communication of the disease from the mother to the infant. The treatment must take up the child immediately after delivery, in order to destroy the germ of the disease, if conveyed from the mother, before it had time to develop. This part of the treatment, however, is not within the scope and reach of the oculist, who generally receives the infant in a progressed state of the disease. This field of action belongs to the attending physician, to the gynæcologist and nurse, who only are capable to seize the evil at its very root, and to spread the principles of a rational hygiene.

The rules for the prophylactic and hygienic measures are as follows:—

1. Every pregnant woman with a pathological discharge from the vagina has to be most carefully attended to from the earliest, in order that at the time of the confinement the maternal passages should present, as far as possible, normal conditions.

2. Every examination of a pregnant woman has to be preceded by a complete and careful disinfection of the vagina, and of the fingers and the instruments of the physician.

3. All precautionary measures against the carrying and transferring of infection from the mother or some other source to the infant have to be most scrupulously adhered to. This can be obtained by extreme cleanliness, good ven-

tilation, and strict observance of the principles of antiseptic surgery.

Thus far in regard to the preventive measures to which the woman has to be submitted during the time of her pregnancy and confinement. But no less scrupulous care and attention have to be given to the new born infant from the very first moment of its birth. Prophylactic treatment of the palpebral conjunctiva soon after birth in each case, whether it shows any inflammatory symptoms or not, is the principal rule, the deviation of which should be considered as equally criminal as wilful neglect.

Most of these prophylactic measures have been suggested by Haussmann as early as 1870. In 1879 he again urged the matter before the medical profession, and this time with better success. Credé, of Leipzig, first carried the idea into practical effect. In order to prevent the outbreak of blennorrhœa of the new born infants in the lying-in hospitals, he first disinfected, with carbolic or salicylic acid solutions, the vagina of all those pregnant and parturient women who were afflicted with gonorrhœa or with chronic catarrh of the maternal passages. The percentage of blennorrhœa neonatorum diminished by these measures very considerably, but did not disappear altogether. From October, 1879, he began a prophylactic treatment of the eyes of the new-born infants themselves. The closed eyelids of each child were washed and cleaned outside very carefully with lotions of two per cent. salicylic acid. Then the eyelids were everted, and, after removing every trace of flaky secretion which might be found there, the conjunctiva was inundated with the two per cent. salicylic solution for one or two minutes. Lastly, instillations of a solution of boracic acid (1:60), and later of nitrate of silver (1:40) were made into the eyes. The children of mothers suffering from pathological discharges of the vagina, who had been treated in this way, were saved from blennorrhœa; but other children, who had not been subjected to this method because their mothers had been considered perfectly healthy, became still affected. For this reason the following method was resorted to by Credé from June, 1880. Immediately after birth every babe, without exception, whether of a healthy mother or of a mother suffering from pathological vaginal discharge, had the eyelids cleansed with a soft rag dipped in water, and then had one drop of a two per cent. solution of nitrate of silver dropped be-

tween the eyelids by means of a pipette. Cold applications with a two per cent. salicylic acid solution were then made to the eyes for twenty minutes. The vaginal irrigations were totally abandoned. The result was most satisfactory. At the obstetric clinic at Leipzig, the percentage of ophthalmia came down at first from 13.6 per cent. to 7.6; and after the new method had been inaugurated, there was out of two hundred births only one child affected with blennorrhœa, and in this one case the prophylactic treatment had been omitted by mistake. To these two hundred cases of observation of new-born infants, Credé has recently added four hundred more. Although most of these children were born under most unfavorable conditions, in no case thus treated did blennorrhœa occur. In former years the percentage of blennorrhœa neonatorum in the lying-in hospital of Leipzig, among 287 to 389 yearly confinements, had been from nine to thirteen per cent.

Oelshausen has introduced in the lying-in wards in Halle the following method: The disinfection of the eyes of the new-born infants with a two per cent. carbolic solution is performed immediately after birth, even before the trunk is born completely, and before the eyelids have been opened. Afterwards the eyelids are everted, and the conjunctiva itself is washed out with the same solution. Under these preventive measures the percentage of blennorrhœa neonatorum came down from 12.5 to 3.6 per cent. Of 166 children who had been delivered in 1880, only 6 were affected with ophthalmia, which was much milder in character and course than ever before. Oelshausen places the greatest dependence on washing off and cleansing the lids before they are opened, and also on washing out the conjunctival sac as soon as the child has opened its eyes.

Abegg is of the opinion that the prophylactic use of solutions of nitrate of silver and carbolic acid cannot be trusted in the hands of the midwife or nurse. For the latter he recommends the very efficient remedy, which is absolutely harmless even in unskilful hands, viz., to clean the eyes by copiously inundating them with pure water, and wiping them with a cotton-wool pad dipped in water. This method has been used for years in the lying-in wards of the Obstetrical College of Danzig with the most beneficial results. From the years 1871 to 1880 there occurred 66 cases of blennorrhœa neonatorum out of 2266 births, and these were

only sporadic cases. Serious complications, as ulcerations of the cornea, were not observed at all.

If, however, in spite of all preventive and precautionary measures, or because the latter had been omitted, the infection of the conjunctiva of the new-born infant has taken place, the treatment has to be regulated according to the condition of the morbid process itself. But, before all, the physician ought to impress the maxim upon his mind, and have it impressed upon all it may concern, to regard from the outset every form of conjunctival affection of the new-born infant as a most serious affair, which requires the greatest care and attention in order to bring it to a favorable issue. In this way only the physician may be spared the sad surprises, which are as humiliating to his over-confidence as they are fatal to his professional position. The precautionary measures against the further propagation of the affection, as recommended by Oelshausen, are most worthy of notice and of general application. A child affected with blennorrhœa should only be sucked by its own mother or nurse, and, if possible, be isolated from all healthy children, and have its own bath-tub. If this is not possible, the diseased infant should be bathed last, and no sponges should be used for cleanliness, but cloths, which can afterwards be destroyed. If one eye only is affected, the surest way to prevent the other from getting infected is not the occlusive bandage on the healthy eye, but to swaddle the arms of the babe, to lay the latter upon the side corresponding to the affected eye, and to use the same precaution when nursing it at the breast.

If the new-born infant presents only slight conjunctival catarrh with but very serous discharge, a thorough removal of the latter with luke-warm soap-water, often repeated during the day, and the irrigation of the palpebral conjunctiva with a two per cent. solution of benzoate of soda, two to three times a day, will suffice to effect in a short time a perfect cure. But if the morbid process has run somewhat higher, if the congestion of the conjunctiva is somewhat more pronounced, a solution of sulphate of zinc (1 grain to 3 drachms), to be dropped between the eyelids once or twice a day, will be more efficacious. By all means the eyes of the infant have to be watched most carefully, and the treatment must be continued as long as there is some discharge in the morning after a night's rest at the inner canthus or

between the eyelashes. But if the inflammatory symptoms have reached a higher degree, if there is serous infiltration of the conjunctiva with engorgement of the vessels and sero-mucous secretion, if the lids are swelled and red and of higher temperature, if there is lachrymation and photophobia with more or less pronounced congestion of the conjunctiva of the eyeball—in one word, if the morbid process is in its ascending course, no astringents should be applied at all, and we have to resort at once to ice-cold applications. Compresses of old linen dipped in ice-water have to be applied to the eyelids and changed every minute. The duration of the cold applications and the frequency of the repetition have to be regulated according to the state of the inflammatory symptoms. The higher the latter, the more prolonged must be the procedure, and the oftener the renewal during the day, and respectively the night. In the less severe forms, cold applications for half an hour in succession, repeated three times a day, will generally suffice to abate the inflammatory symptoms. In many instances leeches to the temples or to the nostrils will prove of great efficacy. But if we resort to leeches at all, we have to apply at once from six to ten in order to attain any favorable result. As soon as the acute stage is broken and suppuration has commenced, when the mucous membrane of the lids shows relaxation and succulency with swelling of the papillæ, then, and only then, has come the appropriate time to use the only method of treatment which affords the best chances of a fair result in all instances of blennorrhœa neonatorum—in which a success is possible at all. We refer to the so-called caustic method of treatment with solutions of nitrate of silver. But in order to obtain the desired effect, we have to use the applications methodically, according to the rules as have been set forth in their principal points by no less an authority than Von Graefe. The strength of the solution of nitrate of silver has to be from five to ten and fifteen grains to the ounce of distilled water. The older the affection, the more neglected it had been, the more profuse the discharge and the higher the swelling of the parts, the stronger can be the solution. It is self-evident that the applications can only be made by the competent physician himself, and that they should never, under no condition, be trusted to the hands of the mother or the nurse, however skilled the latter may be.

The applications have to be made with a large camel's-hair brush, and each eye should have two such brushes—one for the solution of nitrate of silver, the other for the solution of common salt, with which to wash off and neutralize the superabundant nitrate. The details of the whole procedure are as follows: At each visit the closed eyelids have to be washed and cleaned outside, by means of a pad of absorbent cotton, with a two per cent. solution of carbolic acid, or a four per cent. solution of boracic acid. This having been done most carefully, a pad of absorbent cotton dipped in the same solution has to be applied to the eyelids, which are slightly drawn apart in order that the discharge which has been inclosed in the conjunctival sac should be sucked up. Then the upper lid has to be turned round, so that the entire palpebral conjunctiva with its retro-tarsal fold should be exposed, and every trace of purulent secretion which may be found there has to be carefully removed with a pad of absorbent cotton. Then covering the cornea with the lower lid, the entire surface of the palpebral conjunctiva has to be brushed over with the solution of nitrate of silver, and immediately washed off with a solution of common salt. This done, the upper lid is allowed to escape, and the same procedure is repeated on the lower lid. Finally, the lids and the surrounding parts are cleaned and dried with a cotton pad, and bathed after each application for half an hour with ice-cold compresses, which have to be changed every minute. Our only guide as to the frequency with which the cauterization should be employed is the appearance of the mucous membrane. We have to wait with the renewal of the application until the whole of the whitish deposit which has formed on the surface of the conjunctiva has disappeared, until the eschar has been removed and suppuration has been re-established. This is the safest and surest indication that the epithelium* has been reproduced, in which case only we are allowed to reassume the use of nitrate of silver, without any danger to apply the caustic to the denuded casement membrane. The application of nitrate of silver to this membrane will in all instances damage its delicate

* The application of a strong solution of nitrate of silver destroys the epithelial layers of the conjunctiva, so that until the epithelium has re-formed the discharge from the inflamed eye will diminish very perceptibly. The reappearance of the yellowish secretion indicates the restoration of the epithelium.

structure and the connective-tissue beneath it, and would be followed by formation of cicatrix. In general the application of nitrate of silver, as described above, will suffice once in twenty-four hours; only in protracted cases of blennorrhœa, with marked hypertrophy of the papillæ and great swelling of the conjunctiva, the cauterization would have to be renewed every twelve hours. For the intervals between each cauterization I generally prescribe a two per cent. solution of benzoate of soda, of which the nurse has to pour a teaspoonful between the slightly-opened eyelids often during the day, in order to remove as far as possible the secretion from the conjunctival sac. Besides, the lids and surrounding parts have to be cleansed frequently with a pad of absorbent cotton, dipped in the same solution, or in a four per cent. solution of boracic acid. The cotton pads have to be burned immediately after they have been used. No sponges are allowed; they never can be cleaned as they ought to be, and they are only the bearer of the germ of the contagion. The nurse has to wash her hands each time after such a manipulation with soap and water, and have them disinfected by cleansing them with a four per cent. solution of carbolic or boracic acid.

This treatment has to be continued until the swelling of the conjunctiva and of the lids has markedly diminished, and the yellowish purulent discharge has become thin and grayish. In this condition of the morbid process weaker solutions of nitrate of silver may be used; eventually we have to make the applications every other day, and resort at last, in the final stage of the disease, to mild astringent solutions, which we may trust to the hands of the mother or the nurse. But great care should be taken to have the eyes under medical vigilance as long as there are traces of swelling and of discharge.

The greatest danger to the preservation of the eyes in this affection lies, as was stated in the earliest part of this treatise, in the cornea becoming involved in the morbid process. The slightest erosion of the corneal epithelium, the slightest infiltration of the corneal tissue, has to be regarded as a most serious complication, which threatens from the outset the integrity of the eyesight. All our therapeutic measures have to be inspired by the only aim to prevent this fatal issue. And the threatening danger to the integrity of the cornea is not so much the cor-

rosive action of the purulent secretion in which the cornea is imbedded, but rather, as Arlt has justly remarked, the pressure from the tumefied and swollen conjunctiva of the lids and the eyeball upon the nutritive vessels of the latter. By this mechanical action the bloodvessels which supply the cornea are strangulated, the circulation is made insufficient, and the cornea may gangrene from want of nutriment.

In all cases of blennorrhœa neonatorum, in which we have to deal with highly-marked serous infiltration or gelatinous exudation of the mucous membranes of the eye and of its underlying tissue, our first indication must be to relieve at once the eyeball from the abnormal pressure of the infiltrated lids, which gives rise to strangulation of the bloodvessels, to blood stasis, and to all its fatal consequences. To attain this end we have two surgical procedures, viz., canthotomy and scarification of the conjunctiva. By canthotomy we understand the division of the outer commissure of the lids by a deep horizontal incision, which has to begin at the external canthal ligament, and be carried through the skin and the fascia down to the bone, taking care, however, to perform the operation with the least injury to the conjunctiva. The incision can be made either with a bistoury or with scissors, and has to be of half an inch or more in length. It is advisable to allow free after-bleeding, which is the best topic depletion of the engorged vessels. By this simple procedure the pressure from the tumefied lids and from the orbicularis upon the vessels, and consequently the stagnation of the latter and the blood stasis is removed, the lids are relaxed, and may now be easily everted, however difficult, or even impossible, it might have been to have them everted before the operation. Besides cleaning there is no especial care to be taken of the wound itself; the latter will gradually heal up, while in the mean time the removal of the external pressure and the improvement in the blood circulation will accomplish their desired effect. I have to mention one accident which may take place after such an enlargement of the lids, and which is apt to frighten somewhat the inexperienced surgeon, the more so as there is no reference made to such an incident in the handbooks of ophthalmology. I have in mind the possible occurrence of prolapse of a lobule of the lachrymal gland between the edges of the divided canthus. This accident I have met

with twice in my oculistic practice. In the first instance immediately after the operation, in the other, the day afterwards, I noticed between the edges of the wound a small lump of about the size of a cherry, and of irregular aciniform surface. In the first case I first tried to replace it, but my repeated attempts to this effect were frustrated by the pressure of the lids consequent upon the violent struggling and crying of the child during medical attendance. At last I left it to itself, as I did from the outset in the second case, and it did me consequently good service in keeping apart, like a wedge, the edges of the wound, and preventing them from uniting too soon. One portion of the displaced lobule sloughed off, the other receded into the orbit. The wound closed perfectly, and no disagreeable after-effects remained.

The second operation consists in small superficial incisions, made with a bistoury or with pointed scissors, in the infiltrated conjunctiva of the lids and of the eyeball, in order to unload the vessels, to effect a sufficient depletion of the latter, and to abate the symptoms of inflammation. These incisions may be repeated in the course of the morbid process according to the indications,

As the case demands, we may resort to both measures simultaneously, or use either of them alternatively. In the greatest majority of cases the canthotomy, which is the most efficient and most reliable method, will answer best our purpose.

I am using now eserine in all cases of blennorrhœa neonatorum in which the symptoms of inflammation are running very high, however healthy an appearance the cornea may represent. A few drops of a solution of eserine, of one grain to three drachms, are instilled between the eyelids once or twice a day. These applications seem to influence very favorably the morbid process. In many instances I have noticed a considerable decrease in the quantity and virulence of the discharge, and consequently a more rapid progress towards recovery. Besides, the frequency of corneal complications seems to have diminished from the time I began to use the prophylactic applications of eserine. The latter remedy has to be used methodically from the very moment the cornea shows the slightest erosion of its epithelium, or the slightest trace of infiltration. In all these instances a few drops of eserine have to be instilled every thirty minutes, until the pupil has

contracted to the utmost. When this point has been reached, instillations of eserine, repeated four to five times a day, will generally suffice. To the same remedy we have to resort in all instances of blennorrhœa neonatorum, in which we have to deal with deeper infiltration of the corneal tissue. But if the maceration of the corneal tissue has progressed so far as to give cause to apprehend perforation of this membrane, and consequently prolapse of iris, the last resort we have in these instances is paracentesis of the anterior chamber. By this operation we understand an incision made at the sclero-corneal border of about four mm. long with the so-called paracentesis needle. Its effect is to evacuate the humor aqueous, to lessen the intraocular pressure, and consequently to diminish the vis-a-tergo, which, pressing against the eroded parts of the cornea, as the locus minoris resistentiæ, must in the course of time bring about perforation of the remaining substance. I have, however, to confess that from the time the experimental researches have established the intimate connection which exists between the minute animal parasites and the development of infectious diseases, I have become less willing and more cautious to open in instances of purulent ophthalmia the anterior chamber, and to give by this proceeding to the bearers of the germ of the disease free access to the interior of the eye, for fear lest I should do more harm than benefit to the diseased organ by my operation. Before the introduction of eserine into the ocular therapeutics our only resort to diminish the intraocular pressure and to free the eroded parts of the cornea from the vis-a-tergo was paracentesis of the anterior chamber. The use of eserine fulfils all these indications. It very considerably diminishes the intraocular pressure of the anterior chamber, lessens the vis-a-tergo, and obviates in this way, as far as possible, the perforation of the cornea. Besides, eserine has this advantage, that, by accelerating the current of the fluids in the tissues, as Weber has shown, it prevents decay and favors restitution of the destroyed substance. The disadvantages of paracentesis in purulent ophthalmia are so salient, the advantages to be derived from its use are so precarious, that the indications for this operation have to be restricted to those cases only in which we have to try every remedy at our disposal in order to promote a better issue. Generally in all cases in which eserine cannot prevent perforation of the cornea, para-

centesis will not do it either. Should prolapse of iris occur, we have to clip the protruding piece of iris, and apply a compressive bandage on both eyes for a few days until the wound has perfectly closed. The neglect of this precautionary measure may entail the further protrusion of iris, and eventually evacuation of the lens and the humor vitreous. Staphyloma of the cornea, or phthisis of the eyeball, would be the consequence. The compressive bandage has to be removed and renewed about four to six times in twenty-four hours, in order to clean the eyes, and to make the necessary applications of nitrate of silver and of eserine. In all cases in which a part of the cornea has escaped suppuration and has remained transparent, be this part ever so small, we have to make an artificial pupil beneath this very transparent part of the cornea as soon as the ophthalmia has completed its course. This operation will give the infant eventually the benefit of prescription of light, and may save it from total blindness.

In three cases of total blindness in which the

infants had been brought to me in the last stages of the affection, there was only a small peripheric border of transparent cornea left in one eye of either child. The infants were respectively eight, eleven, and fifteen weeks old. I performed iridectomy in each case, and had the satisfaction to restore perception of light in all these instances. It was very curious and interesting to see these little creatures moving and bending their heads to and fro in order to bring them to the direction of the rays of light. The features of the face changed from dulness and apathy to brightness and smiles. One child I had occasion to see after three years. The artificial pupil was very small, and situated on the periphery of the upper inner quadrant of the right cornea, the whole of which was totally leucomatous. The child could find its way around the house, and distinguish even small objects. It kept its head turned deeply backwards and inclined to the left shoulder.

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